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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/734,129	12/15/2003	Kenneth J. Young	118114	9151

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EXAMINER

KIM, TAE JUN

ART UNIT PAPER NUMBER

3746

DATE MAILED: 06/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

6

Office Action Summary	Application No.	Applicant(s)	
	10/734,129	YOUNG ET AL.	
	Examiner	Art Unit	
	Ted Kim	3746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____ | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

Claim Objections

1. Claims 3-4 are objected to because of the following informalities: they each lack a period at the end of the claim. Appropriate correction is required.
2. Claims 13-16 are objected as using potentially confusing terminology “the said at least one resonator being supported with respect to the combustion chamber independently of the combustion chamber [by said combustion chamber inner casing or the said outer casing].” Note that in some definitions, the inner and outer casings are part of the “combustion chamber.” Applicant should specifically define the “combustion chamber” as a term that is completely distinct from the combustion chamber inner casing and combustion chamber outer casing.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-3, 12, 22 are rejected under 35 U.S.C. 102(b) as being anticipated by GB 2288600. GB ‘600 teaches a combustion chamber for a gas turbine engine comprising at

least one Helmholtz resonator 1 having a resonator cavity 2 and a damping tube 3 in flow communication with the interior of the combustion chamber, the tube having at least one cooling hole for 9 extending through the wall thereof; a plurality of cooling holes 9 are provided in the wall of the tube; wherein the holes are circumferentially spaced in at least one row extending around the circumference of the tube; the said cavity 2 having substantially similar principle dimensions.

5. Claims 20, 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Bodine, Jr (2,807,931). Bodine, Jr teaches a combustion chamber for a gas turbine engine comprising a plurality of Helmholtz resonators 150 (Fig. 6) each having a cavity and a damping tube in flow communication with the interior of the combustion chamber, the said resonators being circumferentially spaced around the combustion chamber with the respective cavities of diametrically opposed resonators having substantially different volumes; wherein the said resonators are circumferentially spaced around the combustion chamber with the cavities of respective resonators having successively smaller volumes.

6. Claims 13-15 are rejected under 35 U.S.C. 102(e) as being anticipated by Stalder et al (6,370,879). Stalder et al teach a gas turbine engine combustion section including a combustion chamber 1, a combustion chamber inner casing (right side of 7) and a combustion chamber outer casing (top of 7); the said combustion chamber comprising at least one Helmholtz resonator 7 having a cavity and a damping tube in flow communication with the interior of the combustion chamber, the said at least one resonator being supported

with respect to the combustion chamber independently of the combustion chamber 1 by the said combustion chamber inner casing or the said outer casing.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claim 22, 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over GB 2288600. GB '600 appears to teach the principle dimensions being substantially equal but does not illustrate a cube as the 3rd dimension, while inherent, is not illustrated. It would have been obvious to one of ordinary skill in the art to make the principle dimensions substantially equal in all three dimensions as opposed to the illustration in two dimensions as a logical extrapolation of GB '600 to 3 dimensions. As for using a plurality of axially spaced circumferential rows of cooling holes, this is deemed to be within the ordinary skill in the art as an obvious matter of multiplying the number of rows for multiplied effect. It would have been obvious to one of ordinary skill in the art to employ a plurality of rows for multiplied effect.

9. Claims 1-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over GB 2288600 in view of Myrhe et al (4,786,188) and/or Glasheen et al (6,354,733). GB '600 teaches the air 9 is used to shield the Helmholtz resonator from the hot gases inside the

combustor. Myhre et al teach a hot gas system where a tube 27 has axially inclined holes 50 to provide for shielding air to prevent hot combustion gases from entering the tube (see abstract). It would have been obvious to one of ordinary skill in the art to employ axially inclined holes to permit the air of GB '600 to enter the tube. GB '600 does not teach the holes having a tangential inclination. Glasheen et al teach using a tangential and axial inclination for the air inlet 62 which enhances the prevention of the combustion gases from entering the tube (col. 5, lines 33-53). It would have been obvious to one of ordinary skill in the art to employ axially and tangentially inclined holes in order to more effectively prevent the entrance of hot combustion gases into the tube of GB '600. As for the ranges for the swirl angles, this is regarded as an obvious matter of finding the workable ranges in the art. It would have been obvious to one of ordinary skill in the art to employ the claimed ranges, as an obvious matter of finding the workable ranges in the art.

10. Claims 20, 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bodine, Jr. (2,807,931). Bodine, Jr. teaches a combustion chamber for a gas turbine engine (Fig. 2) comprising a plurality of resonators 70, 71, 70b, 72 (see col. 6, lines 10+), one of which 72 is a Helmholtz resonator each having a cavity and a damping tube in flow communication with the interior of the combustion chamber, the said resonators being circumferentially spaced around the combustion chamber with the respective cavities of diametrically opposed resonators having substantially different volumes; wherein the said resonators are circumferentially spaced around the combustion chamber with the cavities of respective resonators having successively smaller volumes. Bodine, Jr does not teach in the

embodiment of Fig. 2, multiple Helmholtz resonators although multiple resonators in general are taught. Another embodiment in Fig. 6 shows the use of multiple Helmholtz resonators 150 which are diametrically opposed and having different volumes and successively smaller volumes. It would have been obvious to one of ordinary skill in the art to employ multiple Helmholtz resonators with different volumes, in order attenuate multiple frequencies which are detrimental to combustion.

11. Claims 17-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aigner et al (5,373,695) in view of Bodine, Jr (2,807,931). Aigner et al teach a gas turbine combustor with an annular combustion chamber 3 and inner casing 33 and outer casing 34 and a windage shield bounded by 33 and 39. Aigner et al do not teach Helmholtz resonators in the windage shield. Bodine, Jr teaches a Helmholtz resonator 71 on the inner side of the gas turbine combustor (Fig. 2) where the resonator appears to be in a windage area. It would have been obvious to one of ordinary skill in the art to place the Helmholtz resonators within the windage shield of Aigner et al, as a protected location and/or analogous location taught by Bodine, Jr for Helmholtz resonators. Bodine, Jr does not teach in the embodiment of Fig. 2, multiple Helmholtz resonators although multiple resonators in general are taught. Another embodiment in Fig. 6 shows the use of multiple Helmholtz resonators 150 which are diametrically opposed and having different volumes and successively smaller volumes. It would have been obvious to one of ordinary skill in the art to employ multiple Helmholtz resonators with different volumes, in order attenuate multiple frequencies which are detrimental to combustion.

12. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over any of the above applied art and further in view of Sattinger et al (6,530,221). The above prior art teach a tube and Helmholtz resonator but do not teach the tube is substantially flush with a heat shield. Combustors with heat shield 52 are old and well known in the art as evidenced by Sattinger et al (see Fig. 4), the heat shield forms a resonator cavity to reduce vibration. It would have been obvious to one of ordinary skill in the art to employ the tube/Helmholtz resonator type to reduce vibration and make the tube substantially flush with the heat shield, in order to reduce the vibrations within the combustor.

13. Claims 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pandalai et al (5,682,157) in view of Bodine, Jr (2,807,931). Pandalai et al teach an annular gas turbine combustion chamber 29 with inner casing 33, outer casing 31 and a $\frac{1}{4}$ wavelength resonator with a cavity and tube 100 connected to the outer casing at 100 and supported independently from the combustion chamber. Pandalai et al do not teach the resonator is a Helmholtz resonator. Bodine, Jr teaches the equivalence of the $\frac{1}{4}$ wavelength resonator with the Helmholtz resonator (col. 6, lines 10+). It would have been obvious to one of ordinary skill in the art to employ a Helmholtz resonator at the claimed location, as a well known or equivalent noise attenuation device.

14. Claims 13-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aigner et al (5,373,695) in view of Bodine, Jr (2,807,931), in view of any of Pandalai et al (5,683,157), Crow (3,982,392) and Stalder et al (6,370,879). Aigner et al teach a gas turbine combustor with an annular combustion chamber 3 and inner casing 33 and outer

casing 34 and a windage shield bounded by 33 and 39. Aigner et al do not teach Helmholtz resonators in the windage shield. Bodine, Jr teaches a Helmholtz resonator 71 on the inner side of the gas turbine combustor (Fig. 2) where the resonator appears to be in a windage area. It would have been obvious to one of ordinary skill in the art to place the Helmholtz resonators within the windage shield of Aigner et al, as a protected location and/or analogous location taught by Bodine, Jr for Helmholtz resonators. Bodine, Jr does not teach in the embodiment of Fig. 2, multiple Helmholtz resonators although multiple resonators in general are taught. Another embodiment in Fig. 6 shows the use of multiple Helmholtz resonators 150 which are diametrically opposed and having different volumes and successively smaller volumes. It would have been obvious to one of ordinary skill in the art to employ multiple Helmholtz resonators with different volumes, in order attenuate multiple frequencies which are detrimental to combustion. Aigner et al do not specifically teach how the Helmholtz resonator would be supported by the inner casing and independently of the combustion chamber. Pandalai et al teach it is old and well known in the art to support the resonator independently of the combustion chamber and by the casing. Tegel et al teach it is old and well known in the art to support a tubular device/igniter 47 by 48 and independently of the combustion chamber. Stalder et al teach it is old and well known in the gas turbine combustor art to support a Helmholtz resonator 4 (Fig. 3) independently of the combustion chamber 1. It would have been obvious to one of ordinary skill in the art to mount the Helmholtz resonator to the combustion chamber inner casing and independently of the combustion chamber, in order to facilitate a well known type of connection used in the art.

Contact Information

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Ted Kim whose telephone number is 571-272-4829. The Examiner can be reached on regular business hours before 5:00 pm, Monday to Thursday and every other Friday.

The fax numbers for the organization where this application is assigned are

703-872-9306 for Regular faxes and 703-872-9306 for After Final faxes.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Thorpe, can be reached at 571-272-4444.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist of Technology Center 3700, whose telephone number is 703-308-0861. General inquiries can also be directed to the Patents Assistance Center whose telephone number is 800-786-9199. Furthermore, a variety of online resources are available at <http://www.uspto.gov/main/patents.htm>



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